REMARKS

Claims 1-36 are now pending in the application. Claims 1-9, 11-27, and 31-36 stand rejected, while claims 10 and 28-30 are objected to as containing allowable subject matter but dependant on a rejected main claim. In this reply, Applicants have amended claims 31-35. Upon entry of the amendments, claims 1-36 remain pending.

Support for the claim amendments is found in the specification as originally filed. Applicants respectfully request entry of the amendments.

REJECTION UNDER 35 U.S.C. § 112

Claims 1-4, 6-9, 11-27, and 31-36 stand rejected under 35 U.S.C. § 112, first paragraph, because the specification allegedly does not provide enablement for all polymers, all hydrophobic polymers, or all fluorocarbon polymers. Applicants respectfully traverse the rejection as applied to the amended claims and request reconsideration.

The statute at § 112 requires that the specification provide an "enabling disclosure". An enabling disclosure is one that allows a person of skill in the art to which the invention pertains to carry out and practice the invention without undue experimentation. The test of enablement is not whether any experimentation is necessary, but whether, if experimentation is necessary, it is undue. In determining whether a specification is enabling, courts have considered a variety of factors known as Wands factors:

A) the breadth of the claims

B) the nature of the invention;

C) the state of the prior art;

D) the level of one of ordinary skill;

E) the level of predictability in the art;

F) the amount of direction provided by the inventor;

G) the existence of working examples; and

H) the quantity of experimentation needed to make or use the invention based on the content of the disclosure.

Not every Wands factor need favor enablement for a specification to be enabled, nor is the list of factors exhausted. However, in the current case, a number of the Wands factors clearly indicate an enabling disclosure.

For example, the level of ordinary skill in the art is high. The development of fuel cells is a highly complex art, requiring high levels of skill in chemistry, engineering, materials, physics, and other fields. Typical researchers and inventors in the field have at least a masters degree in an appropriate academic subject and preferably a PhD. Such inventors are trained in research and routinely carry out experiments to test hypotheses and to develop inventions. The person of high skill reading the current specification could readily determine what polymers, hydrophobic polymers and fluorocarbon polymers would be suitable for a particular application, and could readily carry out the full scope of the current claims with no more than routine experimentation.

Although the chemical arts are sometimes said to be an unpredictable area, in the current case, the mechanism by which the invention operates is readily understood. As explained in the specification, it is a physical effect where a solution or emulsion of polymer is imbibed into a porous substrate. As solvent evaporates through opening in

the mask from the substrate, the polymer particles or molecules move with the solvent according to well understood chromatographic and other considerations. This factor in combination with the high level of skill lead to a conviction that the specification is enabling for the complete scope of the claims.

Consistent with the high level of skill in the art and the predictability of the mechanism, Applicants have given considerable guidance in carrying out their invention. They begin by stating in paragraph 7, that "the invention is exemplified by use of the fluororesin but is not limited thereby". Later, beginning in paragraph 28, they comment on how the invention works:

> "Such fabrics are made of fibers that are capable of being wetted by the polymer solutions. If necessary, a surfactant or wetting agent may be added to the polymer solution to enable the polymer and solvent to wet on the fibers."

Inventors are stating that one of the factors to be considered is the wetting of the fibers in the fabric by the polymer solution. The inventors provide guidance to use wetting agents if necessary to enable the wetting on the fibers.

Later, in paragraph 30, the inventors describe the polymer:

> "The polymer used in the invention and deposited on the sheet material by the methods of the invention is one that will settle out of an emulsion or precipitate out of a solution under the evaporating conditions described below."

Inventors are giving the highly skilled workers in the field a description of the polymers and indicating that there may be some experimentation needed to determine how to deposit the materials in a desired way under certain evaporating conditions.

Later at paragraph 31, the inventors state:

> "The polymer used is one that will impart either a hydrophobic or hydrophilic character to the substrate sheet material where the polymer is deposited."

Further in paragraph 31, the inventors describe the hydrophobic and hydrophilic character. Further, at paragraph 32, the inventors explain that for certain applications, hydrophobic polymers are used. They continue in paragraph 32 with a non-limiting list of hydrophobic polymers. In paragraph 33, they repeat the advice that if desired the polymer compositions can contain surface active agents to aide in wetting the substrate.

Still later, the inventors describe what happens during subsequent steps. For example at paragraph 41:

> "During the drying or evaporation step, the polymer particles such as PTFE particles move with the solvent and settle down at the place where the solvent evaporates from the substrate."

And in paragraph 42:

> "In this way, PTFE particles or other polymer particles are deposited onto the sheet material most heavily at the place where the solvent evaporates from the sheet material."

In light of the specification, the person of skill in the art understands from the disclosure that the polymer is not limited to the polytetrafluoroethylene exemplified. Rather, the person of skill in the art appreciates that a wide variety of polymers can be used, if necessary with routine experimentation to nail down preferred parameters of use.

In light of the discussion above, Applicants respectfully submit that the rejected claims are fully enabled by the specification. Accordingly, Applicants respectfully request that the rejection under § 112, first paragraph, be withdrawn.

REJECTION UNDER 35 U.S.C. § 102

Claims 1, 4-6, 20, and 36 stand rejected under 35 U.S.C. § 102(b) as being anticipated by the Hedge reference (U.S. Pat. No. 6,395,325). Applicants respectfully traverse the rejection and request reconsideration.

Although the disclosure of the Hedge reference is drawn to the manufacture of porous membranes, the disclosure does not describe or suggest every limitation of the rejected claims. In particular, the reference does not disclose or suggest the step of contacting a wet porous sheet material with a pattern member while the sheet material is still wet. Attention is drawn to column 2, line 21 of the reference:

> " Thus, one aspect of this invention is a method for forming a porous membrane, comprising:
>
> dissolving one or more polymers in one or more solvents at a temperature at which a true solution of the polymer or polymers forms;
>
> applying the solution to a surface; and,
>
> drying the applied solution...until the solvent or solvents have been essentially completely evaporated."

At column 12, the reference discusses selectively porous membranes. The reference states at line 24;

> "Once a porous membrane has been formed on a surface using the method described herein, a removable mask, in a pattern corresponding to the areas of the membrane where porosity is to be maintained, is applied to the porous membrane. A second solution of a polymer or polymers is then applied to the masked membrane."

As mentioned in the Office Action, the reference at line 47 states that a selectively porous membrane can be prepared by applying a second solution of a hydrophobic polymer to the masked hydrophilic porous membrane.

It is clear from the above passages of the reference that the step of contacting a still-wet sheet material with a pattern member is completely missing. Rather, the reference clearly teaches to dry the membrane (column 2) and then, once the dry porous membrane has been formed, applying a removable mask to the porous membrane (column 12). In contrast, the rejected claims recite the steps of wetting a porous sheet material with a polymer composition and then, while it is still wet, contacting the wet porous sheet material with a pattern member, followed by evaporating the solvent from the sheet material while in contact with the pattern member. Because these claim limitations are completely missing from the disclosure of the Hedge reference, Applicants respectfully request the rejection under § 102 be withdrawn.

Further, there is no teaching or suggestion to modify what the Hedge reference discloses in order to arrive at the subject matter of the rejected claims. As noted above, the reference clearly teaches drying the porous membrane essentially completely before applying the removable mask to the membrane. To modify the reference to arrive at the subject matter of the claims would be to change the reference such that the porous membrane is not completely manufactured. For this reason, Applicants respectfully submit that the rejected claims are non-obvious in light of the cited reference.

REJECTION UNDER 35 U.S.C. §§ 102/103

Claims 19 and 31-35 are rejected under 35 U.S.C. § 102(e) as anticipated or obvious over the Mathias reference (U.S. Publication. No. 2004/0137311). Applicants

respectfully traverse the rejection as applied to the amended claims and request reconsideration.

Although the gas diffusion layer of the Mathias reference is similar to the product of the application, it is not identical. The diffusion layer of the Mathias reference is performed by pulling dust through a substrate, as described for example in paragraph 16. The dust comes from a sintered PTFE layer that is applied to at least one side of the diffusion medium. The dust is generated from grinding and the dust is pulled into the body of the diffusion layer by a vacuum table. Thus, in the Mathias reference, the particles are deposited from the solid state and captured in the body of the membrane.

In current claim 19 on the other hand, the polymer particles in the diffusion medium are deposited from a solution or emulsion by slow evaporation of the solvent. Deposition of the polymer by precipitation from a solution yields a different structure than capture of ground dust particles in the fibers of the substrate. Accordingly, Applicants respectfully request that the rejection as applied to claim 19 be withdrawn.

Claims 31-35 have been amended to recite the steps of making a diffusion media by the methods of the invention and incorporating that diffusion media into a fuel cell. The cited reference does not disclose or suggest making a diffusion media in such a manner and incorporating it into a fuel cell. Accordingly, Applicants respectfully request the rejections as applied to claims 31-35 be withdrawn.

Claims 31-35 stand rejected under 35 U.S.C. § 102(b) as anticipated or obvious over the Cisar reference (U.S. Publication No. 2003/0068544). Applicants respectfully traverse the rejection as applied to the amended claims and request reconsideration.

As noted, Applicants have amended claims 31-35 to recite methods of preparing a fuel cell by making a diffusion media according to the methods of claims 1 or 20. The Cisar reference does not disclose or suggest making diffusion media for fuel cells in such a manner. Accordingly, Applicants respectfully request the rejection of claims 31-35 in view of the Cisar reference be withdrawn.

Claims 31-35 are rejected under 35. U.S.C. 103(a) as anticipated or obvious over the Tetzlaff reference (U.S. Patent 5,104,497). Applicants respectfully traverse the rejection as applied to the amended claims and request reconsideration.

Applicants have amended claims 31-35 to recite a method of making a fuel cell by making diffusion media and incorporating them into the fuel cell. The Tetzlaff reference does not disclose or suggest such a method of making a diffusion media for use in a fuel cell. Accordingly, Applicants respectfully request the rejection, as applied to the amended claims, be withdrawn.

REJECTION UNDER 35 U.S.C. § 103

Claims 7-8 and 22-27 stand rejected under 35 U.S.C. § 103(a) as obvious in view of the Hedge reference. Applicants respectfully traverse the rejection and request reconsideration.

The deficiencies of the Hedge reference with respect to independent claims 1 and 20 have been discussed above. Applicants respectfully submit that the rejected claims are non-obvious over the reference for similar reasons, the rejected claims depending from respectively claims 1 and 20. Accordingly, Applicants respectfully request that the rejection be withdrawn.

ALLOWABLE SUBJECT MATTER

Applicants note with appreciation that claims 10 and 28-30 are considered to contain allowable subject matter. The Office Action states they would be allowable if rewritten to overcome the rejections under 35 U.S.C. § 112, first paragraph and to include all the limitations of the base claim and any intervening claims.

Applicants have successfully traversed the first paragraph § 112 rejections and have established that the base claim and any intervening claims are patentable in light of the cited art. Accordingly, Applicants respectfully submit that claims 10 and 28-30 are allowable as written and need not be amended.

CONCLUSION

For the reasons discussed above, Applicants believe that claims 1-36 are in an allowable condition and respectfully request an early notice of allowance. The Examiner is invited to telephone the undersigned if that would be helpful to resolving any issues.

Respectfully submitted,

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